

Quiz #1

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A signal $x[n] = u[n]$ is applied to a system with impulse response $h[n] = \left(\frac{3}{4}\right)^n u[n]$.

1- Find $y[n]$ equation.

2- Find $y[n]$ at $n=0, 2, 4, \infty$.

$$y[n] = \sum_{k=-\infty}^n x[k] h[n-k]$$

$$y[n] = \sum_{k=-\infty}^n u[k] \left(\frac{3}{4}\right)^{n-k} u[n-k]$$

$$y[n] = \left(\frac{3}{4}\right)^n \sum_{k=-\infty}^n \left(\frac{4}{3}\right)^k = \left(\frac{3}{4}\right)^n \left(\frac{1 - \frac{4}{3}^{n+1}}{1 - \frac{4}{3}} \right)$$

at $n=0 \rightarrow y[n] = 1$ ✓

at $n=2 \rightarrow y[n] = 37/16$ ✓

at $n=4 \rightarrow y[n] = 3.05$ ✓

at $n=\infty \rightarrow y[n] =$ **4**